

Minnesota.—8th.
Missouri.—18th, 27th.
Nebraska.—7th, 10th, 12th, 21st, 22d, 26th, 28th.
Nevada.—12th.
New Jersey.—7th, 17th, 28th.
New York.—1st, 6th, 7th, 9th, 11th, 18th, 30th,
North Carolina.—3d, 10th, 12th, 15th, 17th.
Ohio.—1st, 2d, 5th, 10th, 14th, 16th, 21st, 25th.
Oregon.—23d, 24th, 25th, 27th.
Pennsylvania.—2d, 17th, 18th, 21st, 26th, 28th, 30th.
Rhode Island.—1st, 7th, 11th, 15th, 28th.
South Carolina.—7th.
Tennessee.—2d, 12th, 14th, 21st, 26th, 27th, 29th.
Texas.—4th, 11th, 16th.
Utah.—25th.
Virginia.—5th, 9th, 14th, 17th, 22d, 24th, 26th, 30th.
Washington Territory.—8th, 20th, 23d.
Wisconsin.—4th, 27th.
Wyoming.—3d, 12th, 13th, 15th, 16th, 18th, 19th, 25th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories as follows:

Alabama.—27th.
Arizona.—3d, 21st, 22d, 25th.
Arkansas.—21st, 26th, 28th, 29th.
California.—23d to 26th.
Colorado.—26th.
Connecticut.—25th.
Dakota.—22d to 26th.
Florida.—20th to 27th, 30th.
Georgia.—24th, 26th, 27th, 29th.
Illinois.—21st, 27th.
Indiana.—20th, 21st, 23d, 24th, 27th, 29th.
Iowa.—1st, 20th, 22d, 23d, 24th, 26th, 27th, 28th.
Kansas.—4th, 20th, 24th, 26th, 27th, 28th.
Kentucky.—20th, 23d, 27th.
Louisiana.—19th, 24th.
Maine.—20th, 23d, 27th.
Maryland.—1st, 18th.
Massachusetts.—7th, 25th.
Michigan.—1st, 20th, 23d to 27th.
Minnesota.—23d, 26th, 28th.
Missouri.—1st, 24th, 26th, 28th.
Montana.—Fort Shaw, 23d.
Nebraska.—19th, 21st, 22d, 26th.
Nevada.—24th, 25th.
New Hampshire.—30th.
New Jersey.—1st, 2d, 24th, 27th.
New York.—1st, 25th, 27th, 30th.
North Carolina.—1st, 20th, 21st, 23d, 26th to 29th.
Oregon.—20th, 23d, 24th, 25th.
Pennsylvania.—18th, 21st, 25th, 27th.
Rhode Island.—25th.
South Carolina.—22d, 28th.
Tennessee.—1st, 2d, 20th, 21st, 23d, 25th, 26th, 27th, 29th, 30th.
Texas.—1st, 23d, 24th, 25th, 27th, 28th, 30th.
Virginia.—1st, 2d, 22d, 24th to 28th.
Washington Territory.—21st, 24th, 25th.
Wisconsin.—1st, 24th, 26th, 27th.
Wyoming.—Fort Bridger, 23d.

The phases of the moon during April were: last quarter, 7th, 9.36 a. m.; new moon, 15th, 12.46 a. m.; first quarter, 21st, 6.14 p. m.; full moon, 29th, 1.08 a. m.; apogee, 6th, 11.30 a. m.; perigee, 18th, 9.48 a. m.

MIRAGE.

Milwaukee, Wisconsin: on the 26th, at 2 p. m., Racine Point, twenty-five miles south of Milwaukee, was plainly visible.

Duluth, Minnesota, 30th: three small islands on the south shore of Lake Superior, ordinarily not visible, were plainly seen on this date.

Mackinaw City, Michigan 4th.
 Saint Vincent, Minnesota, 2d, 4th.
 Fort Totten, Dakota, 12th.

Webster, Dakota, 1st, 2d, 4th, 5th, 8th, 9th, 11th, 12th, 14th, 15th, 17th, 18th, 23d, 24th, 26th, 28th, 29th, 30th.
 Sherlock, Kansas, 6th, 15th, 16th, 28th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-four stations show 4,897 observations to have been made, of which seven were reported doubtful; of the remainder, 4,890, there were 4,205, or 86.0 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for April, 1885:

Date— April, 1885.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 10 a. m.	0	0	0	0	0	0	3	50†	
4, 4 p. m.	3	20†	0	0	1	8†	6	50†	
5, 1 p. m.	0	30†	0	15†	0	0	5	60†	
6, 5 p. m.	1	5†	0	10†	1	1	6	50†	
9, 12 m.	1	45†	0	0	0	0	4	90†	
11, 10 a. m.	1	30†	0	0	0	3	5	120†	
14, 6 p. m.	0	0	0	0	0	0	2	40†	
16, 5 p. m.	0	0	0	0	0	0	1	30†	
18, 6 p. m.	0	0	0	0	0	0	1	10	
20, 6 p. m.	2	5	0	0	1	3	3	15†	
22, 6 p. m.	0	5†	0	0	0	0	3	20†	
23, 10 a. m.	0	10†	0	0	0	0	3	30†	
25, 10 a. m.	0	0	0	0	0	0	6	25†	
27, 12 m.	3	10†	0	0	1	3	5	35†	
30, 12 m.	1	25†	0	0	1	5	7	50†	

Faculae were seen at the time of every observation. †Approximated.

Professor Carpenter, of Lansing, Michigan, reports sun spots during the month of April as follows:

1st, 2 groups, 20 spots; 4th, 3 p. m., 3 groups, 17 spots; 6th, 3 p. m., 5 groups, 40 spots; 18th, 1 p. m., 2 groups, 13 spots; 21st, 2.45 p. m., 4 groups, 30 spots; 25th, 5 groups, 16 spots; 29th, 3 p. m., 5 groups, 28 spots. On account of cloudy weather, which prevailed during the greater part of the month, the above were the only observations made.

EARTHQUAKES.

The following notes, referring to the earthquakes which have occurred in California during April, 1885, are taken from the reports of Signal Service and voluntary observers and from various newspapers published in California:

Salinas, Monterey county, 2d.: at about midnight an earthquake shock was felt, its probable oscillation was from north to south.

Fresno, Fresno county, 2d.: a sharp shock of earthquake was felt at this place this morning about 7.25 o'clock. The shock appeared to come from the east. (*San Francisco Evening Bulletin*, April 2d.)

Merced, Merced county, 2d.: a heavy shock of earthquake was felt here at 7.25 this morning. It was noticed by many persons in different parts of the town, but most sensibly in the third and fourth stories of El Capitan Hotel. (*San Francisco Evening Bulletin*, April 2.)

Sacramento, Sacramento county, 3d.: earthquake shocks were felt at 10.15 a. m., lasting a few seconds; two distinct shocks occurred with a motion from northeast to southwest.

San Buenaventura, Ventura county, 7th: two distinct shocks of earthquake were felt here this morning at 2 o'clock. The shocks were from northeast to southwest. (*Sacramento Daily Record Union*, April 8.)

Bakersfield, Kern county, 7th: a shock of earthquake occurred here at 2.30 a. m.; it lasted about two seconds, and the motion was from north to south. It was followed by a rumbling

noise, and the trembling of the earth lasted nearly a minute. (*Sacramento Daily Record Union*, April 8.)

Santa Barbara, Santa Barbara county, 7th: a heavy shock of earthquake was felt here at about 2 a. m. (*San Francisco Daily Examiner*, April 9.)

Salinas, Salinas county, 11th: at 7.45 p. m. an earthquake shock, with a motion from north to south, was felt; it began as a light shock, suddenly turning to an up and down motion which was quite severe; it then ended as it had begun—with a light rolling motion. The observer did not notice the length of time it lasted, but its duration was longer by far than any shock he has hitherto experienced. Buildings creaked strangely and people everywhere fled to the streets.

San Rafael, Marin county, 11th: an earthquake shock was felt at 8.06 a. m.; it had a long and slow motion from southwest to northeast.

Sacramento, Sacramento county, 11th: earthquake shocks occurred at 11.05 p. m., lasting several seconds; there were two shocks, the motion being from west to east.

San Francisco, 11th: a shock of earthquake was felt at 11.05 p. m.; it was very slight but continued for about twenty seconds, the movement being from east to west.

Keeler, Inyo county, 11th: a slight earthquake shock occurred at 11.05 p. m. (eastern time); a gentle tremor, which lasted about two seconds, was felt; its direction was from northwest to southeast, or parallel with the course of the valley.

Fresno, Fresno county, 11th: a sharp shock of earthquake was felt here at 8.03 p. m. (*San Francisco Daily Alta California*, April 12.)

Marysville, Yuba county, 11th: at 8.05 p. m., a slight shock of earthquake occurred at this place. (*San Francisco Daily Alta California*, April 12.)

San José, Santa Clara county, 11th: a shock of earthquake was felt here at 8.05 p. m. It was from east to west and lasted about twenty seconds. (*San Francisco Daily Alta California*, April 12.)

Monterey, Monterey county, 11th: the heaviest shock of earthquake since 1868 visited this place at about 8.10 p. m. The shock had the semblance of a continuous, rolling wave, traveling from west to east, and was preceded by a rumbling noise closely resembling that made by a runaway wagon. * * * Little damage was done further than the enlarging of cracks made by previous shocks in the adobe buildings. A few more shakes will render many of the adobes unsafe as dwellings or stores. (*San Francisco Daily Alta California*, April 13.)

Ione, Amador county, 11th: an earthquake shock occurred here at 8.15 p. m.; it lasted about fifteen seconds. The oscillation was from south to north. This is the second shock that has occurred here within the last two weeks. (*San Francisco Daily Alta California*, April 13.)

Hanford, Tulare county, 11th: at 8.10 p. m., a very perceptible shock of earthquake was felt here, lasting twenty seconds. A lighter shock was noticed this morning (April 12th). (*San Francisco Daily Alta California*, April 13.)

Keeler, Inyo county, 18th.—An earthquake shock, lasting about three seconds, occurred shortly before midnight (local time), the exact time being unknown. The shock was sufficiently severe to disturb people who were asleep; it was preceded by a loud report, as of an explosion.

Hydesville, Humboldt county, 25th.—A light shock of earthquake was felt at 8.20 p. m.

Blue Lake, Humboldt county, 25th.—An earthquake shock occurred at about 7.30 p. m., lasting a few seconds; the motion was apparently from south to north.

Professor C. G. Rockwood of Princeton, New Jersey, furnishes the following:

The New Haven Palladium, April 30th, 1885, contained this: GUILFORD, NEW HAVEN COUNTY, April 28, 1885.—A severe earthquake shock was felt here about ten minutes past five o'clock this afternoon. It was followed by heavy thunder. Windows rattled and houses shook from stem to stern. Crockery fell from the shelves in many houses, causing gen-

eral consternation among the inhabitants. The movement seemed to be from west to east and lasted about one second. Lightning, rain, and thunder followed about half past five o'clock.

The following notes are taken from "Nature" of April 16, 1885:

A sharp shock of earthquake was felt in Rome on the night of the 9th instant. Bells were set ringing, and many persons were momentarily alarmed by the movement, but that was the extent of its effect. Professor Stefano Michele de Rossi has communicated the following report to the press: "At 2.44 a. m. a distinct shock of earthquake aroused a great part of the population of Rome. From the observations obtained, it belonged to the sixth degree of the conventional scale of ten degrees for intensity. It undulated from southwest to northeast, and then from northwest to southeast. The full duration was about ten seconds, of which four were occupied by the second phase of the phenomenon. A telegram from Avezzano states that the shock was very strong there in the direction of north to south. No damage was done."

Telegrams received later from Frosinone report that a shock was felt there at the same time, with sufficient force to create general alarm among the population.

There has been a renewal of earthquake shocks in the provinces of Granada and Malaga, Spain. Early on the morning of the 11th oscillations of more or less violence are reported from Velez Malaga, Antequera, Motril, and the city of Granada itself and some surrounding villages. So far as is known there has been no loss of life or serious damage, but the panic at some places is described as intense, and the inhabitants, refusing to return to their homes, remain in the open country.

Several shocks of earthquake were felt at Geneva, Switzerland, on the 13th.

PRAIRIE AND FOREST FIRES.

Vineyard Haven, Dukes county, Massachusetts, 18th: an extensive forest fire prevailed in the woods northwest of this place, endangering the dwellings in the northern part of the town; more than two hundred acres of valuable wood were destroyed.

Anburn, Schuylkill county, Pennsylvania, 19th: a forest fire burned over about one hundred acres of woodland near this place, endangering a number of dwellings.

Athens, Clarke county, Georgia: forest fires destroyed a considerable quantity of fencing northeast of this place on the 21st.

Erie, Pennsylvania: on the 21st it was reported that more than one hundred acres of forest and farm land between Fairview and Girard, in this county, were burned over by forest fires.

Petersburg, Virginia, 22d: much valuable timber has been destroyed in Dinwiddie county.

Wilton, Camden county, New Jersey, 22d: forest fires have caused much damage at Hayes' Mill and in the forests south of this place.

Atco, Camden county, New Jersey, 23d: it is estimated that the damage to buildings, forests and other property, caused by forest fires, will aggregate \$80,000.

Mount Carmel, Northumberland county, Pennsylvania, 23d: during the last two days much valuable lumber in the pine forests of this region has been destroyed by fires.

Williamstown, Gloucester county, New Jersey, 23d: about two hundred acres of cedar timber have been burned in this section and much other damage has been caused by forest fires.

Huntingdon, Huntingdon county, Pennsylvania, 24th: forest fires burned over an area of about 3,500 acres in extent in Diamond valley, causing a large amount of damage.

Blue Rock, Chester county, Pennsylvania, 24th: more than two hundred acres of woodland near here have been destroyed by forest fires.

Dennisport, Barnstable county, Massachusetts: a large tract of woodland between North Harwich and South Dennis, in this county, was burned over on the 25th. More than two hundred acres of standing timber with several barns and other buildings were burned.

Staunton, Virginia, 29th: reports from Allegheny, Augusta, Highland, Rockbridge and Rockingham counties, state that forests and fencing in those counties have been destroyed by forest fires.

Prairie and forest fires have also been reported from the following places:

Voluntown, Connecticut, 25th.
 Wentworth, Dakota, 10th, 11th, 14th, 17th, 24th, 27th.
 Allison, Kansas, 9th, 10th.
 Yutan, Nebraska, 15th.
 Sherlock, Kansas, 2d, 3d, 6th, 8th, 9th, 11th, 13th, 14th.
 De Soto, Nebraska, 1st, 4th.
 Red Willow, Nebraska, 27th.
 Genoa, Nebraska, 4th, 10th.
 Chambersburg, Pennsylvania, 23d, 24th.
 Brattleborough, Vermont, 19th, 22d.
 Wyttheville, Virginia, 23d.
 Variety Mills, Virginia, 16th, 23d, 24th, 25th.
 Dale Enterprise, Virginia, 28th.
 Lynchburg, Virginia, 26th.
 Wilmington, North Carolina, 3d, 7th, 12th.
 Fort Yates, Dakota, 4th, 5th, 14th.
 Burlington, Iowa, 5th, 13th.
 Lamar, Missouri, 8th, 10th.
 Fort Elliott, Texas, 1st.
 Fort Sully, Dakota, 4th, 5th.
 Yankton, Dakota, 4th, 5th, 7th, 9th, 10th, 11th, 14th, 17th.
 North Platte, Nebraska, 1st, 14th.
 Fort Assinaboine, Montana, 14th.
 Dodge City, Kansas, 13th.
 Fort Reno, Indian Territory, 1st, 3d to 6th, 7th, 9th to 20th.
 Pike's Peak, Colorado, 5th, 13th.
 Fort Sill, Indian Territory, 10th, 15th.

MIGRATION OF BIRDS.

Geese flying northward.—Red Bluff, California, 4th, 5th, 22d;
 Cape Mendocino, California, 16th; New Haven, Connecticut,
 3d; Voluntown, Connecticut, 3d; Fort Bennett, Dakota, 1st,
 2d, 3d, 14th, 15th; Fort Reno, Indian Territory, 2d, 6th; Gut-
 tenberg, Iowa, 4th, 10th, 19th; Dubuque, Iowa, 14th; Cedar
 Rapids, Iowa, 1st; Bangor, Maine, 5th; Baltimore, Maryland,
 1st; Emmitsburg, Maryland, 1st; Swartz Creek, Michigan,
 16th; Saint Vincent, Minnesota, 10th, 15th; Moorhead, Min-
 nesota, 14th; Yutan, Nebraska, 2d, 25th; Little Egg Harbor,
 New Jersey, 6th; Humphrey, New York, 2d, 30th; Kitty
 Hawk, North Carolina, 25th; Albany, Oregon, 7th, 8th, 9th,
 12th, 15th, 16th; Portland, Oregon, 17th; Troy, Pennsylvania,
 3d; Nyatt Point, Rhode Island, 1st, 8th; Point Judith, Rhode
 Island, 1st, 2d, 3d, 7th, 9th; Narragansett Pier, Rhode Island,
 2d to 5th; Strafford, Vermont, 3d; Burlington, Vermont, 6th;
 Tatoosh Island, Washington Territory, 3d, 4th, 5th, 13th, 15th,
 21st, 23d to 26th, 29th, 30th; Fort Canby, Washington Terri-
 tory, 25th, 26th, 27th; Milwaukee, Wisconsin, 25th.

Geese flying southward.—Red Bluff, California, 2d; South-
 ington, Connecticut, 3d; Charleston, Illinois, 8th; North Vol-
 ney, New York, 14th.

Ducks flying northward.—Cedar Rapids and Guttenberg,
 Iowa, 1st; Independence, Iowa, 2d; Davenport, Iowa, 12th;
 Dubuque, Iowa, 19th; New Orleans, Louisiana, 28th; Saint
 Vincent, Minnesota, 15th; Cape Lookout, North Carolina, 15th;
 New River Inlet, North Carolina, 13th; Toledo, Ohio, 12th;
 Dorset, Vermont, 2d, 3d; Tatoosh Island, Washington Terri-
 tory, 12th.

Cranes flying northward.—Yutan, Nebraska, 18th; West Leav-
 enworth, Kansas, 1st; San Antonio, Texas, 10th, 18th.

METEORS.

San Francisco, California, 20th: at 2.00 a. m., a meteor was
 observed in the northwestern heavens; the sky was illuminated
 with an intense brightness; the meteor was apparently as large
 as a man's head and left a trail which remained visible from
 one to two minutes.

Webster, Dakota, 2d: a bright meteor flashed across the
 heavens at 9.40 p. m. It started about 3° south of Jupiter and
 moved in an easterly direction, leaving a long trail behind it.

Indianola, Texas, 18th: at 11.25 p. m., a beautiful meteor
 shot across the sky from a point apparently near the "Great
 Bear" to within 18° of the horizon; before disappearing it burst
 in many fragments.

Meteors were also observed at the following places:
 Yuma, Arizona, 3d.
 North Colebrook, Connecticut, 5th.
 Voluntown, Connecticut, 13th.
 Allison, Kansas, 2d, 3d.
 Emmitsburg, Maryland, 19th, 21st.
 Taunton, Massachusetts, 14th.
 Chester, Minnesota, 30th.
 Dover, New Jersey, 20th.
 Jacksonborough, Ohio, 4th.
 Pittsburg, Pennsylvania, 19th.
 Stateburg, South Carolina, 5th, 7th, 15th.
 San Antonio, Texas, 9th.
 Wyttheville, Virginia, 14th, 26th.
 Pleasant Grove, Washington Territory, 17th.
 Tatoosh Island, Washington Territory, 22d, 25th.

POLAR BANDS.

Polar bands were reported during the month by the follow-
 ing stations:

Archer, Florida, 7th, 21st, 26th.
 Montrose, Colorado, 25th.
 Riley, Illinois, 27th.
 Guttenberg, Iowa, 5th.
 Maud, Kansas, 8th, 10th, 21st.
 Amherst, Massachusetts, 7th, 9th.
 Escanaba, Michigan, 25th.
 Moorestown, New Jersey, 5th, 7th.
 Mountainville, New York, 18th.
 Tiffin, Ohio, 9th.
 Nashville, Tennessee, 6th, 7th,
 El Paso, Texas, 28th.
 Rio Grande City, Texas, 6th, 10th, 11th, 21st, 22d.
 Dale Enterprise, Virginia, 3d.
 Wyttheville, Virginia, 14th, 26th.
 Bainbridge Island, Washington Territory, 23d.
 Prairie du Chien, Wisconsin, 26th.

WATER-SPOUTS.

The bark "Ceylon," on April 10, 1885, in N. 31° 00', W.
 71° 00', was struck by a water-spout, carrying away the main
 and mizzen masts, killing the first mate and injuring the
 captain.

S. S. "Anchoria" Captain Small, on the 13th, in N. 41° 20', W.
 58° 30', saw several water-spouts. They made their appearance
 when the wind, which had been very variable all day, shifted
 suddenly to the west, and after they disappeared the weather
 immediately cleared.

S. S. "City of Chester," H. Condron, commanding, on the
 29th, when in N. 41° 30', W. 63° 30', passed a very large
 water-spout.

DROUGHT.

Los Angeles, California, 15th: the rains of the past few days
 have been of great benefit to crops which were suffering in
 consequence of drought.

Olympia, Washington Territory, 30th: the season thus far
 is considered the driest that has been known since the settle-
 ment of the country. It is reported that low, swampy places
 have become perfectly dry, that were never before known to
 be free from water.

Milledgeville, Georgia, 30th: the month has been very dry;
 on only one day, the 25th, was the soil saturated.

SAND STORMS.

Fort Yates, Dakota, 13th.
 Wilcox, Arizona, 20th.
 Wickenburg, Arizona, 26th.
 Fort Thomas, Arizona, 20th, 22d.
 Yuma, Arizona, 3d, 10th, 11th, 19th, 20th, 26th.
 Keeler, California, 20th.
 Dodge City, Kansas, 8th.
 Yutan, Nebraska, 10th.